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TRANSACTIONS
OF THE
Nova Scotian Institute of Natural Science.

ART. I.—NOTES ON THE DEBERT COAL FIELD, COLCHESTER
CO., N. S. BY EDWIN GILPIN, JR., A. M., F. G. S.,
F. R. S. C., *Inspector of Mines.*

(Read 12th Nov., 1883.)

DURING the past few months a good deal of interest has been shown in Mining circles over the reported discoveries of coal seams, of workable size, on the DeBert River, Colchester Co. In this conclusion the following notes of a brief visit to the ground may prove interesting to the members of the Institute, and I only regret that the attention necessarily directed to mines in operation has prevented me from giving more time to the problems presented by this practically unknown district.

The presence of coal beds on the DeBert and Chiganoise Rivers has long been known to the geologist. Gesner, one of the pioneers of Nova Scotian Geology, writing in 1836, described the signs of coal at various points along the north side of the Basin of Minas, from Cape Chignecto to Truro, and remarks, page 129 of his "Geology and Mineralogy of Nova Scotia," that "About five miles northward of the Lower DeBert bridge the coal measures of the mountains rise above the gypseous and saliferous sandstones, and a beautiful section of their strata is made by the river passing over them. Two small veins of coal have been intersected, although it is not known what quantity of that valuable substance is still hidden in the adjacent rocks."

Dr. Dawson, in the second edition of his *Acadian Geology*, page 264, speaks of the metamorphic slates of the Cobequid Mountains being succeeded by conglomerates, and then by "coal measure rocks, consisting of gray sandstones and dark shales,

and a few thin seams of coal, and abundance of leaves of cordaites, and a few calamites and stigmaria."

He further remarks: "We can trace this coal measure back from Advocate Harbour, near Cape Chignecto, to the upper part of the Salmon River of Truro, where it adjoins the carboniferous district of Pictou. It is (generally speaking) much broken and disturbed; and although it widens considerably towards its eastern extremity, it nowhere attains a great development, either in horizontal extent, or in the magnitude of its coal seams." From Advocate Harbour to Partridge Island the belt contains contorted shales and sandstones yielding a few fossil plants, scales of fishes, and shells of Naiadites. Mr. Matthew Jones, a member of this Institute, some years ago found in these strata footprints of a large reptilian animal, referable to the genus sauropus. Similar shales and sandstones outcrop on the banks of the various rivers falling into the Basin of Minas, and show beds of bituminous limestone, with cyprids and fish scales, fireclays, clay ironstones, etc., and yield characteristic fossil plants of several of the species found in the Joggins section.

In the same work Dr. Dawson has discussed the physical conditions which governed the deposition of the coal and associated carboniferous measures of the district. The evidence of the foldings of the carboniferous of the north side of the Basin of Minas, plainly given by the various river sections, leads to the anticipation that the coal measure band may prove disturbed. The longitudinal foldings are useful to the prospector, as they bring the various coal crops to the surface, and define the limits within which his researches can be carried on with profit. The transverse folding and faults caused by unequal strains, and by the irregularity of the great mountain chain, the determining element, may prove a source of expense to the miner engaged in economic development.

The upper DeBert bridge, on the Londonderry road, appears to be a little to the south of the centre of the Basin in this locality. Following the stream downwards from the bridge the coal beds appear about in the relative order of the section, which is descending geologically speaking:—

| | <i>Ft.</i> | <i>In.</i> |
|--|------------|------------|
| Strata..... | 200 | 9 |
| Coal seam..... | 2 | 6 |
| Strata..... | 120 | 0 |
| ? Coal seam (so-called "nine feet")..... | 9 | 0 |
| Strata..... | 30 | 0 |
| Coal seam..... | 2 | 0 |
| Strata..... | 140 | 0 |
| Coal seam..... | 6 | 0 |
| Strata..... | 100 | 0 |
| Conglomerate, base of section. | | |
| Total..... | 609 | 6 |

The first seam met is one on the west side of the River, and it is stated to measure about 2 ft. 6 in. of coal. The nine feet seam, so-called, had not been opened at the time of my visit, and the thickness is that given by the man in charge of the boring. The seam below this is exposed on the west bank of the river, nearly on the line of the seam just referred to as being nine feet thick.

The six feet seam was opened last winter by a short slope, and about 50 tons of coal were extracted. It is stated to have in the centre a band of shaley coal about 9 inches thick. I was unable to verify the dimensions by actual measurement, as all the openings were full of water at the time of my visit, but the outcrop of the bed under the waters of the river apparently confirmed them.

The coal looked unusually well for a crop exposure, and samples selected to form an average gave the following results:—

Coal compact. Cleavage planes very obliquely inclined to each other. Fractures of the coal presented a conchoidal and lustrous appearance. The deposition planes showed a good deal of mineral charcoal. The coal is laminated with numerous bright pitchy layers up to one-half of an inch in thickness. A few films of calc-spar showed in the cleavage planes, and there was very little visible pyrites. Powder dark reddish brown.

ON ANALYSIS (*by fast coking.*)

| | |
|----------------------------------|---------|
| Hygroscopic moisture..... | 1·594 |
| Volatile combustible matter..... | 33·188 |
| Fixed carbon..... | 58·206 |
| Ash..... | 7·012 |
| | <hr/> |
| | 100·000 |
| Sulphur..... | 2·648 |
| Coke fairly coherent. | |

From this analysis it will appear that the coal, although holding more sulphur than is usually found in the coals of Nova Scotia proper, is of good quality, and similar in general composition to that mined at Spring Hill.

About 100 feet below the 6 feet seam is a bed of conglomerate, having a dip to the north similar to that of the section given above. The conglomerate appeared to be about 150 feet wide on the river, and to grow broader to the westward. Where exposed on a small brook about $\frac{1}{3}$ of a mile west of the river, it presented a double dip S 5° W and N 10° W, apparently forming the saddle of an anticlinal, and was overlaid to the south by gray shaley sandstones dipping S 5° W and at an angle of 25°.

On the north side of the conglomerate, on the brook, at about the same distance from it as the so-called nine foot seam is on the river, an imperfect exposure of coal is met presenting the following section:—

| | <i>Ft. In.</i> |
|------------------------------|----------------|
| Coal, with shaley bands..... | 2 0 |
| Fireclay | 2 2 |
| Coal, good..... | 0 10 |
| | <hr/> |
| Total..... | 5 0 |

About 100 feet further up the brook a four feet seam of coal is said to have been proved by a bore hole.

About 100 yards above the bridge is an exposure of measures holding a seam of coal about 18 inches thick, and running nearly at right angles to the course of the seams already described. From this it would appear that the beds exposed on the river are

at the eastern apex of a subordinate basin formed by transverse folding.

Should further research show that at this point the seams referred to maintain their size, and extend in a form permitting of economic exploitation, the discoveries are of great importance. The search for similar seams may then reasonably be made at other points along the coal band, and certainly the areas of the Minas Basin coal field is large enough to allow a hope that in the future it may be added to the list of our productive districts.

ART. II.—NOTES ON THE MANGANESE ORES OF LOCH LOMOND,
C. B. BY EDWIN GILPIN, A. M., F. G. S., F. R. S. C.,
Inspector of Mines.

(Read 14th Jan., 1884.)

FOR a number of years the presence of these ores in Cape Breton was recorded only by the mineralogist. Recently, however, deposits of economic value have been found and worked. The ores of manganese occur, in Nova Scotia proper, in strata of Lower Carboniferous age, occupying a horizon low down in the Marine Limestone formation. The late Dr. How, in a paper read before this Institute some years ago, gave an interesting account of these minerals as they occur and are worked in Hants County. This evening I purpose merely to draw the attention of the Institute to their occurrence in Cape Breton, an interesting fact, as the knowledge of their presence in workable amounts in the Loch Lomond district will lead to a search for them in other parts of the Island. In all probability, the wide extent of the Cape Breton Limestones will before long afford several localities containing deposits worthy of the miner's attention. My notes are from a visit to the mine, and from information kindly furnished me by Mr. Fletcher, of the Geological Survey of Canada, who made a detailed survey of this district summer before last. The geological features of this part of Cape Breton are represented by a band of millstone grit extending from Mira River,

up the Salmon River, to Loch Lomond; and bounded on the north by the felsites of East Bay, and on the south by the felsites of the Mira Hills. At several points the Lower Carboniferous marine limestone formation crops out beneath the millstone grit, and occurs as isolated patches resting directly on the felsites, and there are patches of the basal carboniferous conglomerates brought up by faults through the millstone grit.

The locality in which these deposits have been discovered is on the Salmon River Road, about two miles east of Loch Lomond, near the line dividing Cape Breton and Richmond Counties.

The felsites formed a shore along which we now find limestones, conglomerates, shales and grits exposed as they were accumulated under the varying conditions of current, depth of water, and of the prevailing winds of the period under consideration. At some points the limestones rest on the felsites, at other points conglomerates and shales intervene. The discoveries of manganese ores, more particularly the subject of my paper, were made in one of these bays, where the felsites are succeeded by shales, grits, conglomerates, and finally by limestones, the latter extending apparently from point to point of the ancient Bay.

The manganese ores are found at the Western, or McCuish Mine, in irregular bedded layers in a soft arenaceous shale, which is in places calcareous, and coated with manganese oxide. The layers vary in thickness up to 18 inches, and are sometimes connected by vertical stringers of ore. The shales when weathered present nodules of ore, and large quantities are present as films on the cleavage planes of the shale.

At the Eastern, or Morrison mine, the ore at the time of my visit was mined from a bed underlying a thin layer of black mangiferous limestone, with red and greenish shales and sandstones and conglomerate. The thickness of the ore and of the limestone varied from 2 to 8 inches. The average thickness of the two layers being 8 inches.

The ore was found at several other points in the vicinity as lenticular masses and irregular nests in conglomerate, etc., and

sometimes forming the cementing material. This latter mode of occurrence is similar to that shown by the red hematites found in the lower carboniferous conglomerates at several parts of the island near their junction with older strata. And near the Loch Lomond post office a highly manganiferous red hematite occurs under conditions apparently of a similar nature.

The limestone overlying these measures is highly manganiferous and ferriferous, and contains numerous crystals of galena, which some time ago incited prospecting, as they were thought to be silver ore.

The ore from the Western, or McCuish mine, is a fine-grained pyrolusite, sometimes holding a little brown, or hard ore. It is generally amorphous, but the better grades show a subcrystalline structure. The McCuish ore is a soft black amorphous ore, apparently of high order. At several points considerable masses of lenticular hard ore are met, with calespar and heavy spar. The minerals associated with the ore are calcite, baryte and limonite.

The following analyses by Mr. G. C. Hoffman, Analyst to the Geological Survey, will show the character of the ores :—

Sample No. 1.—Pyrolusite with a little manganite, gave—

Binoxide.....81·52 per cent.

Sample No. 2, consisting almost exclusively of pyrolusite, gave

Binoxide.....88·98 per cent.

Ferric oxide 21 “ “

Ores represented by the above analyses would be adapted for all uses to which the mineral is usually put, and especially to glass making.

As the extent of manganiferous ground is considerable, and the quality good, it is to be hoped that these ores will form a permanent addition to the list of Cape Breton exports. Up to the close of the year 1883 about 200 tons have been shipped.

These ores have been worked by Mr. E. T. Moseley, who deserves credit for having inaugurated a new mining industry in Cape Breton County.